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Standards-based Product Lifecycle Management – STEP into PLM



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Outline

- ❑ What is PLM?
- ❑ Examples of lifecycle data
- ❑ Need for PLM
- ❑ Commercial Solutions
- ❑ PLM for DoD acquisition lifecycle
- ❑ Need for standards
- ❑ Recommended standards
- ❑ Notional architecture
- ❑ Benefits/ Limitations
- ❑ Conclusions

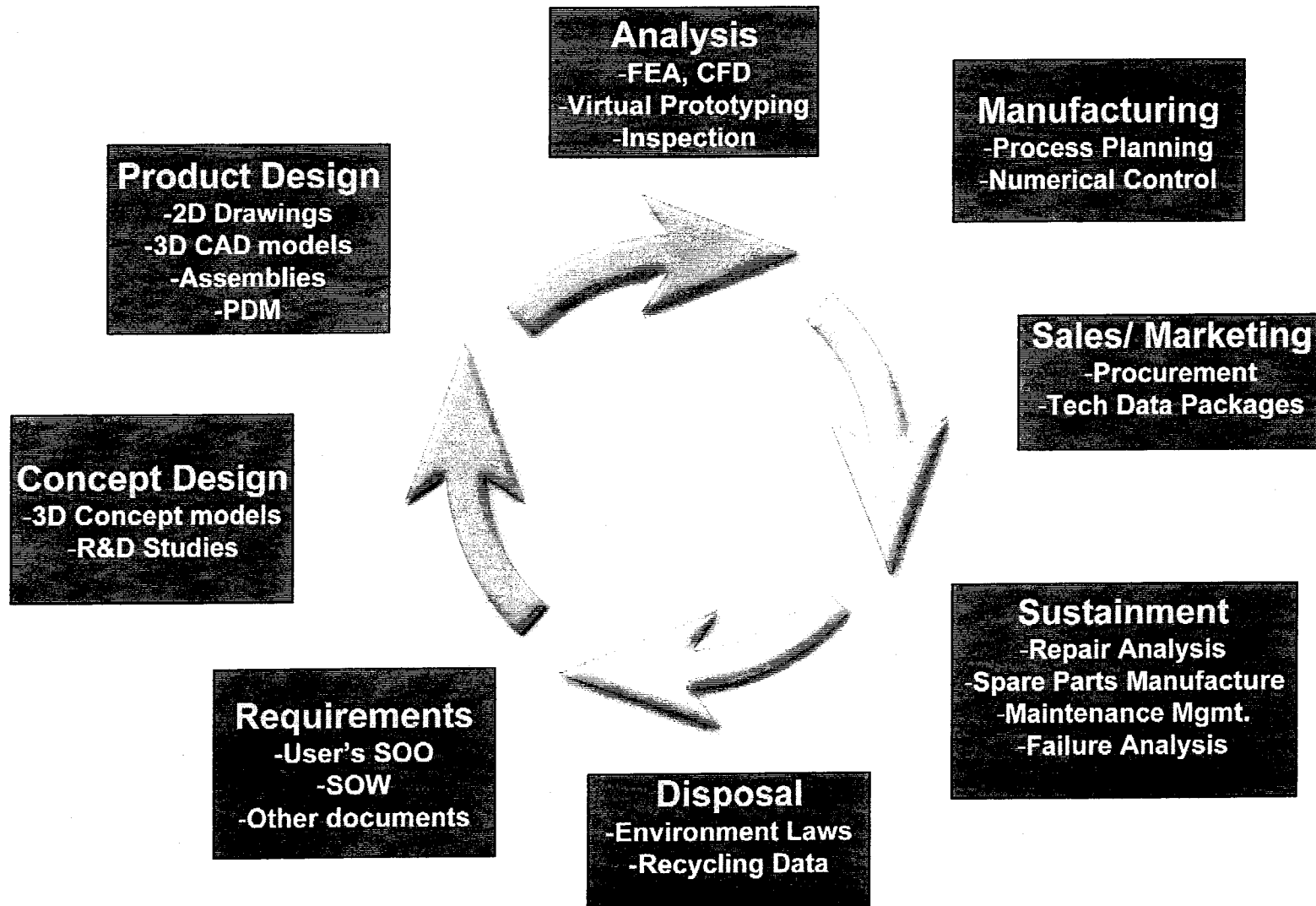
What is PLM?

- ❑ **Product Lifecycle Management (PLM)** is an integrated, information-driven approach to all aspects of a product's life, from its conceptual design through manufacture, deployment and maintenance—culminating in the product's removal from service and final disposal.
- ❑ PLM software suites enable accessing, updating, manipulating and reasoning about product information that is being produced in a fragmented and distributed environment.
- ❑ Another definition of PLM is the integration of business systems to manage a product's life cycle.

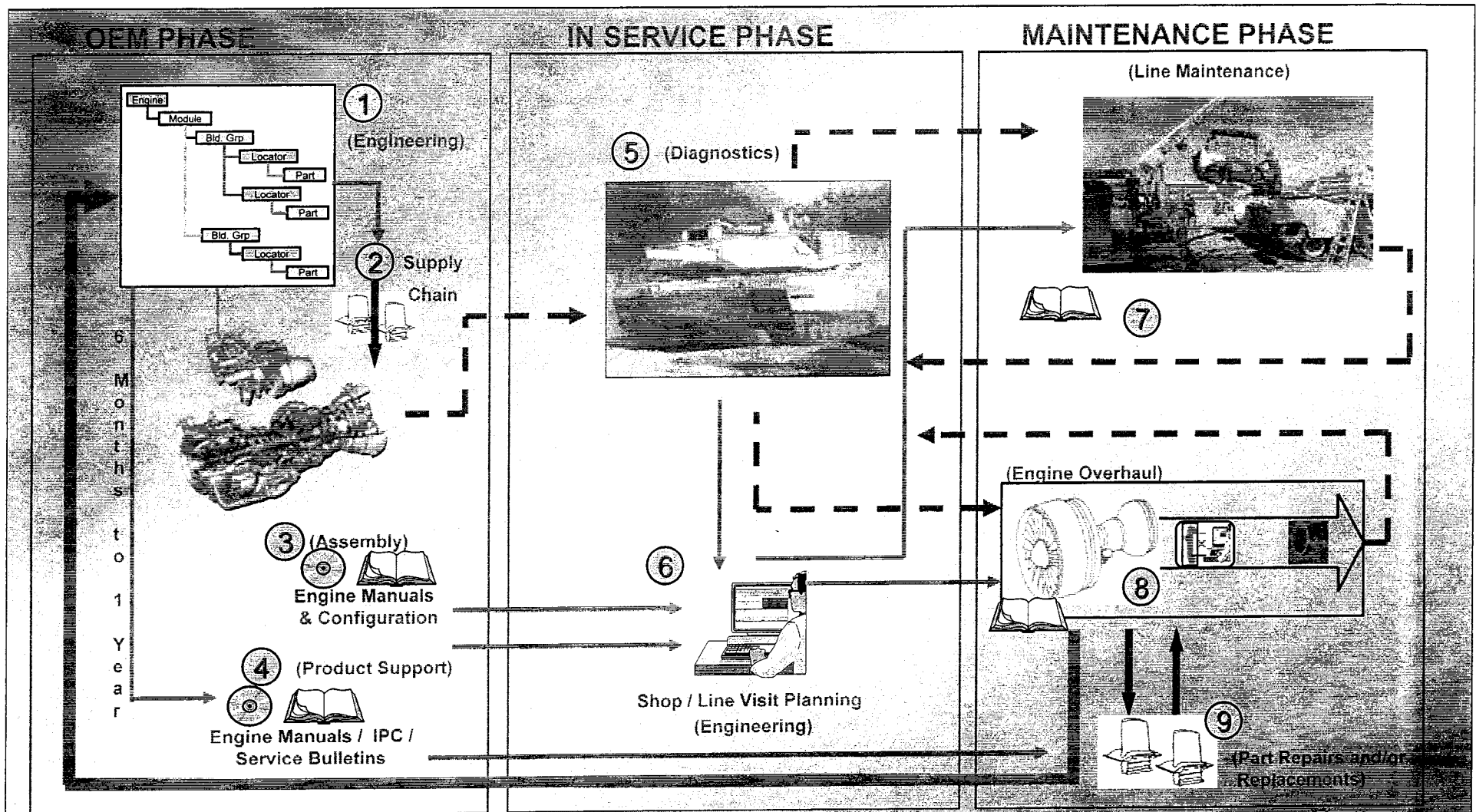
Stackpole, B. (2003, May 15, 2003). There's a New App in Town. CIO.

PLM = People + Software + Processes

Examples of lifecycle data



Example



* Source from Pratt & Whitney

Technical Data has multiple users

Need for PLM

- ❑ Integrate product data throughout the supply chain
- ❑ Manage and control product data – store once, use many times
- ❑ Improve business efficiency
 - Reduce time to market
 - Shorter cycle and lead times
 - Improved productivity

Commercial solutions

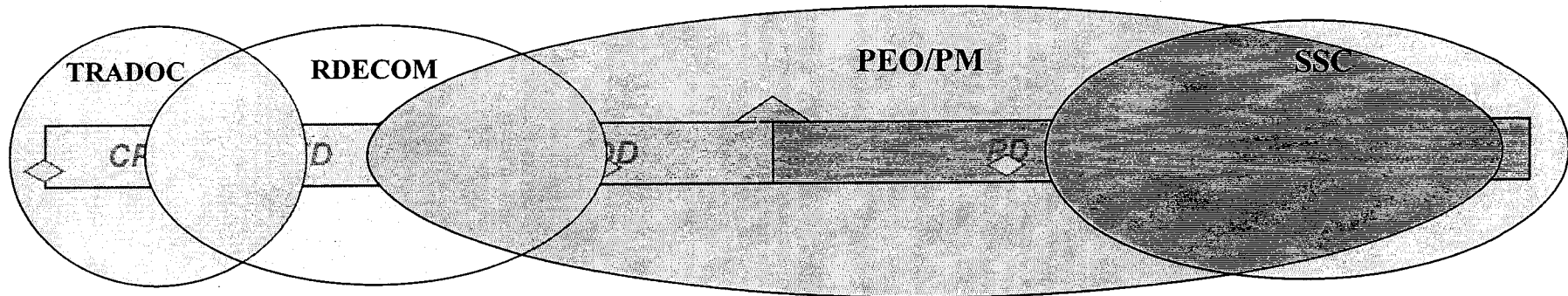
- ERP-based

- SAP
- MatrixOne
- Agile

- CAD-based

- Unigraphics PLM Solutions
- IBM-Dassault PLM Solutions
- PTC

PLM for DoD acquisition lifecycle



CONCEPT EXPLORATION

- Analysis of Alternatives
- Operational Analysis
- Business Process Reengineering

COMPONENT ADVANCED DEVELOPMENT

- Advance Concept Tech Demo
- Systems Architecture Developed
- Component Technology Demo

SYSTEM INTEGRATION

- System Definition Effort
- Preliminary Design Effort
- Functional Baseline
- Allocated Baseline

SYSTEM DEMONSTRATION

- Product Baseline
- Detail Design Effort

LRIP – RATE

- Establish Manufacturing Capability
- Low Rate Initial Production
- Initial Operational Test and Live Fire Test
- Full Rate Production
- Deployment
- Tech Manual Development

SUSTAINMENT

- Block Modifications
- Engineering Change Proposals
- Evolutionary Requirement Development
- Test and Evaluation

DISPOSAL

- Environmental Compliance

Need for standards

- Interoperability
 - CAD-CAD
 - PDM-PDM
 - PLM-PLM
- Open non-proprietary data formats
- Not tied to a specific software solution
- Easier to handle legacy data
- Potential long term solution to archive product data

Recommended standards

- ❑ ISO 10103 – Standard for Exchange of Product Data (STEP)
- ❑ STEP is made up of several separate protocols (called Application Protocols – AP) covering a wide spectrum of engineering design
- ❑ Is already widely used to exchange 3D solid models (AP 203)
- ❑ Protocols for other product data types in development

STEP on a page

ISO TC184 SC4

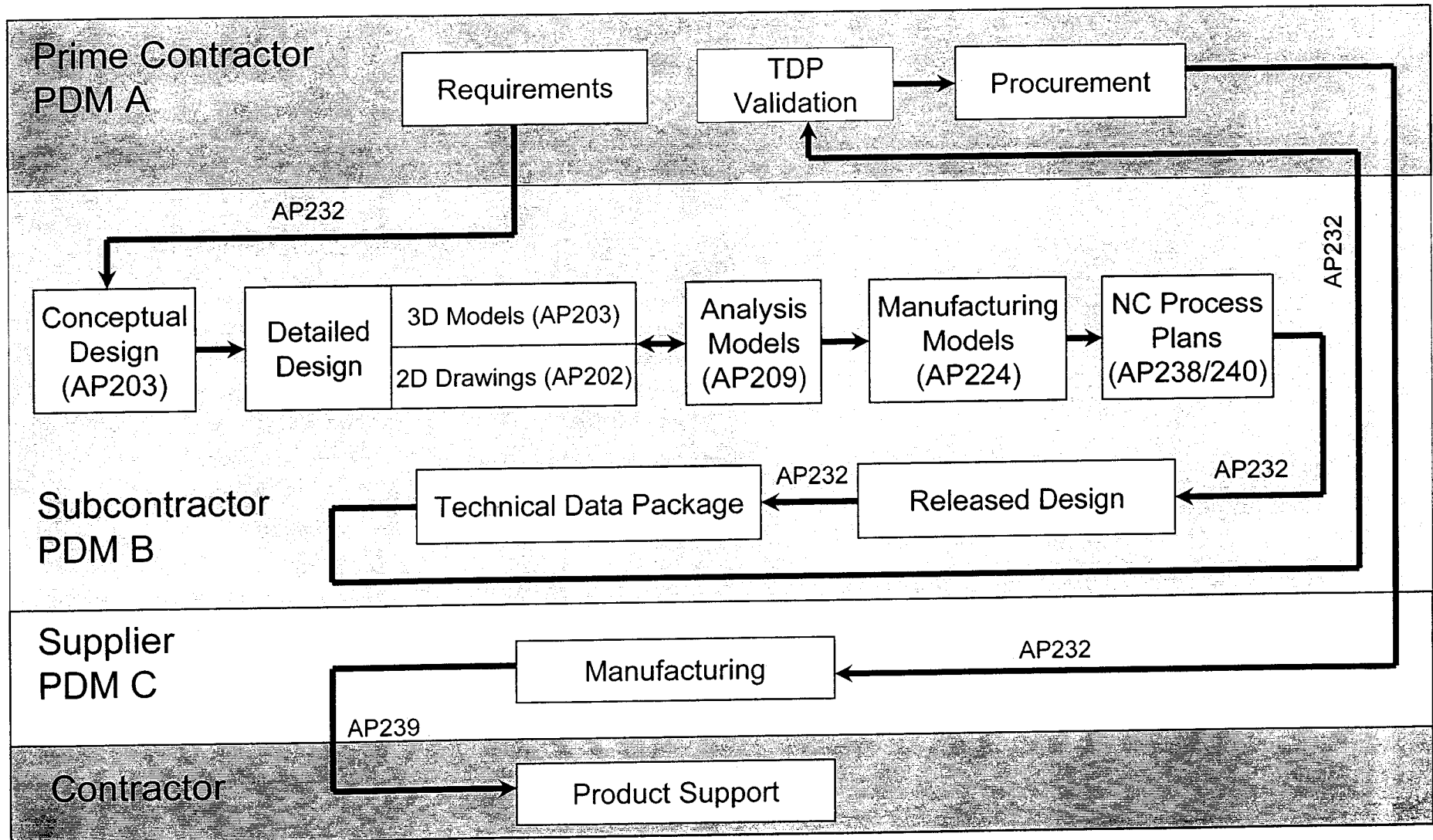
STEP on a Page

ISO 10303

APPLICATION PROTOCOLS AND ASSOCIATED ABSTRACT-TEST SUITES

I 201 Explicit draughting [ATS 301 - X]	C 221 Functional data & their schem rep for process plant [X]
I 202 Associative draughting [X]	X 222 Design-manuf for composite structures [W]
I 203 Configuration-controlled design (e2-La1-D)[X]	X 223 Exch of design & mfg product info for cast parts [a]
I 204 Mechanical design using boundary rep [I]	I 224 Mech pdt def for p. plg using mach'n'g feat (e2-X.e3-A)
X 205 Mechanical design using surface rep [W]	I 225 Building elements using explicit shape rep [C] [X.I]
X 206 Mechanical design using wireframe [X]	X 226 Ship mechanical systems [C]
I 207 Sheet metal die planning and design [I]	I 227 Plant spatial configuration(e2-C) [X]
X 208 Life-cycle product change process [X]	X 228 Building services: HVAC [X]
I 209 Composite & metal structural anal & related design[X]	X 229 Design & mfg product info for forged parts[X]
I 210 Electronic assy, interconnection & packaging design [X]	X 230 Building structural frame, steelwork [X]
X 211 Electronic P-C assy: test, diag, & remanuf[X]	X 231 Process-engineering data [X]
I 212 Electrotechnical design and installation [C]	I 232 Technical data packaging, core info & exch [I]
X 213 Num control (NC) process plans for mach'd parts [X]	W 233 Systems engineering data repr (to be PAS 20542)[X]
I 214 Core data for automotive mech design processes (e2-E)[E]	X 234 Ship operational logs, records, and messages[X]
E 215 Ship arrangement [X]	W 235 Materials info for des and verif of products [X]
E 216 Ship moulded forms [X]	W 236 Furniture product and project data[W]
X 217 Ship piping [X]	W 237 Computational Fluid Dynamics
E 218 Ship structures [X]	A 238 Computer numerical controllers
X 219 Dimension inspection [X]	W 239 Product life-cycle support
O 220 Proc. plg, mfg, assy of layered electrical products [X]	W 240 Process plans for machined products

Notional architecture



Limitations

- ❑ STEP standards are still evolving
- ❑ Standards not available for all types of product data
- ❑ PLM vendors will need to support STEP standards
- ❑ Configuration management between native and STEP files could be a problem
- ❑ Potential loss of data through translators
- ❑ Need ERP systems to support STEP as well

Conclusions

- ❑ PLM recognized as essential for large enterprises to efficiently manage lifecycle product data
- ❑ Companies will use best of breed solutions
- ❑ Standards essential for interoperability in the supply chain
- ❑ STEP standards are still in infancy but hold great potential

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